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Clinical Proceedings

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EPENDYMOMA OF THE SPINAL CORD
H. Mateos, M.D., Jonathan Williams, M.D. 193

POTTS DISEASE OF THE LUMBAR SPINE WITH PSOAS ABSCESS
Allen S. Lloyd, M.D., William S. Anderson, M.D., Marvin M. Gibson, M.D., William J. Tobin, M.D. 197

CLINICAL PATHOLOGICAL CONFERENCE
E. Clarence Rice, M.D., Grace H. Guin, M.D., Adrian Recinos, Jr., M.D., Joseph M. LoPresti, M.D. 201

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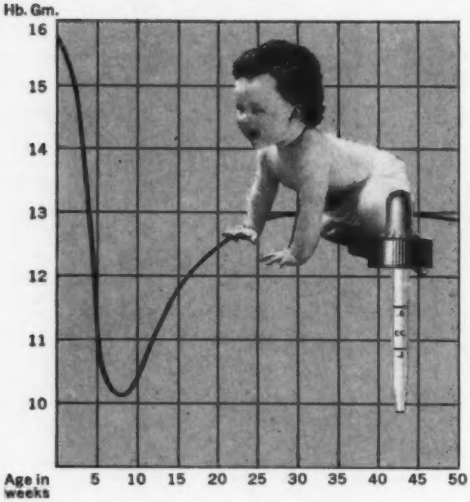

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(1) Niccum, W. L.; Jackson, R. L., and Stearns, G.: A.M.A. Am. J. Dis. Child. 86: 553, 1954. (2) Smith, C. H.: Bull. New York Acad. Med. 30: 155, 1954. (3) Smith, N. J., and Rosello, S.: J. Clin. Nutrition 1: 275, 1953. (4) Sturgeon, P.: Pediatrics 13: 107, 1954.

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EPENDYMOMA OF THE SPINAL CORD

Weekly Case Conference

H. Mateos, M.D., Jonathan Williams, M.D.

Temper tantrums, abdominal and leg pain, later with sphincter incontinence, led to the diagnosis of spinal cord tumor in this child. At surgery an ependymoma was found.

CASE REPORT

The patient, a five year old white girl, was admitted for the first time to Children's Hospital on January 26, 1956 because of enlarged cervical lymph nodes, and a temperature of 102 degrees. Under treatment with tetracycline, the fever disappeared, and even though the nodes remained enlarged, the patient was discharged, to be followed by the private physician. The patient returned twice to the Out Patient Department because of cervical adenitis and was treated with sulfisoxazole and tetracycline. In view of the persistence of adenitis, admission was again recommended. On admission the patient complained of abdominal pains and had large non-tender nodes in the left cervical region. Her pharynx and tonsils were red. Neurological examinations were negative. CBC, urinalysis, and x-rays of the neck were normal. Chest x-ray showed increase of bronchovascular markings. The child was treated with antibiotics and the cervical lymphatic nodes disappeared. She was discharged asymptomatic on January 28, 1956. During this admission the patient refused to eat almost completely and was very difficult to approach. She would cry and displayed almost daily temper tantrums.

The patient continued to complain of severe sharp abdominal pains of short duration and of some pain in the left leg. Her gait became broad based and she would bend forward when walking. In March, the gait became spastic, and urinary and fecal incontinence appeared. The patient's behavior problem became more difficult to handle as she cried at the slightest approach and when an examination was intended.

On April 2 she was admitted to the Neurological Service because of the symptoms described above. On neurological examination she had normal cranial nerves, decreased motility and strength in both legs, and increased tonus. On sensory examination she had normal position and vibratory sense but a suggestive level of decreased perception of pain at T 5. Reflexes were normal and no Babinski was found.

A lumbar puncture produced xanthochromic fluid and a Queckenstedt maneuver proved a complete obstruction. The protein content was 1560 mgm. per 100 ml. A myelogram showed a complete obstruction at L 1 level.

The diagnosis of tumor of the spinal cord was made on the basis of these findings and ependymoma or meningioma considered the best possibilities.

On April 5 a laminectomy was performed from L 2 to T 10 and a large tumor removed from L 1 to T 10. The tumor was a dark red color, presented necrotic characteristics of the lower portion and seemed to arise from the center of the cord. The patient tolerated the procedure well.

After surgery, a saddle anesthesia was found and the patient was not able to void. A catheter was placed in the bladder for two days and the patient started on urecholine until the urinary function returned. Some constipation was also present, but

enemas and laxatives corrected this condition. The patient did not complain again of abdominal pain and ten days after surgery was performed, physical therapy and x-ray therapy were started.

The bowel control has returned and the bladder control is almost complete. The patient is now walking with crutches and the impression is that within a few weeks she will be able to walk without them. A Taylor brace is being used to help stabilize the back. The child's behavior has improved enormously after relief from pain. The pathological diagnosis was ependymoma, cellular type, malignant.

DISCUSSION

Dr. Mateos:

The differential diagnosis in a patient, such as the case presented today, can be difficult overall in the first stages of the disease. Many patients have suffered unnecessary laparotomies when the first symptom of a spinal cord tumor was pain in the abdomen. The urinary incontinence may also be diagnosed as a behavior problem. Of the multiple causes that can produce pressure on the spinal cord, we should consider first the ones derived from the vertebral column; tuberculosis is one of the most frequent. Osteomas, hemangiomas of the vertebral body, multiple myeloma and sarcoma are also conditions that can produce bone destruction and subsequent spinal cord compression. A diagnosis can usually be made from bone biopsy and x-ray examination.

In the epidural space, one common cause of pressure is metastatic carcinoma. The symptoms of spinal cord pressure by metastases are often the first manifestation of carcinomas of prostate, breast, or lung. Hodgkin's disease invades the epidural space. The other manifestations of these conditions usually make the diagnosis.

Hydatid cysts have also been found in the epidural space.

Of the vascular anomalies, aneurysms and varicose veins can produce pressure on the spinal cord. Hemangioblastomas, lymphoblastomas, and neuroblastomas have been described in the epidural space.

In the intradural space, several types of tumors have been identified. The most common are neurofibromas and neurilemmomas, meningiomas, and teratoid tumors. Metastic medulloblastomas and cerebellar sarcomas also have been described.

In the intraspinal class, ependymomas, astrocytomas, glioblastomas, and oligodendrogliomas are the most frequent types and can be associated with syringomyelia complicating the neurological picture.

The ependymomas are derived from the ependymal cells lining the ventricular system and the central canal of the spinal cord. They occur predominantly in children and young adults. Forty per cent are located above the tentorium. Of the 60 per cent below the tentorium a great number are located in the midline and in the roof of the fourth ventricle.

Of 200 tumors of the filum terminale reviewed in the Armed Forces Institute of Pathology, 60 per cent were ependymomas, and it can be said that 50 per cent of the gliomas of the spinal cord are ependymomas. Kernohan divides the ependymomas into four groups and calculates that the survival period of one group is about half the next one. This is true also for tumors in the brain and fourth ventricle.

Some ependymomas are encapsulated but in others no clear demarcation is found. Cystic formation is common in cerebellar ependymomas. Calcium, microscopically, is found frequently in ependymomas and sometimes great deposits demonstrable by x-rays are found. Multiple ependymomas are very rare and so is the meningeal implant. Grade IV ependymomas are also called ependymoblastomas (Bailey).

Dr. Williams:

There are two neurological conditions which are sometimes overlooked in the study of the child with acute abdominal pain. Admittedly these are not common but they may throw some light on the problem. Number one, is abdominal epilepsy with cramp-like abdominal pain, many times mistaken for an attack of appendicitis. If I remember correctly, out of some 14 or 15 such children in our clinic, only one of them does not have a right lower quadrant scar. The second, is this condition of a spinal cord tumor. If a child with a tumor in the spinal canal is old enough he will give evidence of pain along the routes of those nerves arising from the involved segments. So not uncommonly, with dorso-lumbar tumors, these children will talk about stomach aches because of the distribution of the branches of the lower dorsal and lumbar nerves. This child complained rather grievously of abdominal pain to the degree that the complaints, in the absence of discrete findings of intra-abdominal pathology, were thought to be due to an over-protective mother, and the child was considered a behavior problem simply because the usual signs of acute abdominal disease were not present.

In the specialized type of practice that is pediatrics, one has to consider in addition to the tumors that Dr. Mateos mentioned, certain developmental anomalies acting as tumors that are present in and about the vertebral canal in the child. Probably the foremost of this type is the association of a lipoma with spina bifida, the lipoma being within the spinal canal, and of sufficient proportions to compress the neural structures near it; for all intents and purposes, a spinal cord tumor. The tipoff on this particular condition is the presence of a spina bifida, which is very readily recognizable by x-ray. Teratomas of the spinal cord and of the vertebral canal also occur, and also tend to present themselves early rather than late in life. In a pediatric survey of spinal cord tumors they make up a significant percentage of the total.

The neuroblastoma is also a tumor that shows itself quite often in the pediatric age group, and when growing in the vertebral gutter can extend both ways, not only causing involvement of the lung tissue with a large mass in the thoracic cavity, but also penetrating through the vertebral foramina into the vertebral canal producing signs of an independent tumor.

Spinal cord tumors are not common; they occur once to 5 or 10 brain tumors; and brain tumors, of course, are not too common either, making up approximately 10 per cent of all tumors of childhood.

I would like to point out a couple of things which may tip us off to the presence of a spinal cord tumor. Number one is urinary difficulty. Although diet can influence a child's or an infant's bowel movements to a considerable degree, as all you who practice pediatrics know, there are relatively few things that will interfere with urinary control, so when it occurs in a small child it is something of considerable significance. If it can not be pinpointed to the urologic system, immediate thought should be given to the possibility that the child has developed a neurogenic bladder and from that point on, further search can be made for ancillary findings which would tend to support the diagnosis of a spinal cord tumor. Everytime I walk through the wards and see a child with an indwelling catheter I immediately become interested as to why an infant or a small child should have to have a catheter. I believe that in the case of neuroblastoma that was presented a few months ago, the diagnosis was made or suspected when Dr. Maksim gave a demonstration of how to catheterize a small infant, and ended up with about 800 or 900 cc. of urine, a totally unexpected volume considering the size of the child.

Secondly, spinal cord tumors affect motility of the individual, and progressive loss of the use of the legs or the arms or both are of considerable interest, particularly when such a loss is associated with sensory changes. Some people may doubt that one can examine a child for sensory changes. I think it can be done. While talking to the child and getting the child to talk. one can gently move a sharp instrument upward from below. If the child suddenly breaks its conversation, one realizes that an immediate appreciation of something different has occurred at that point. If one can do that three or four times around the body he may be able to draw a line indicating that a sensory level does exist. We were able to do this with this child and if I remember correctly, she had some vague sensory changes up around the chest.

Malignancy of this tumor is something that comes up for consideration, not only from an academic point of view but from a practical point of view. The ependymoma is really classified in most instances as a malignant tumor pathologically, but from a practical point of view, its behavior is quite surprising, particularly in the spinal cord. It can frequently be surgically

removed completely, that is, to the satisfaction of the surgeon, and the whole tumor seems to slip out. In addition the ependymoma is radiosensitive and x-ray treatment is quite effective. I have in mind particularly a 5 year old boy whom we operated on here some 8 or 9 years ago, who had a dorsal spinal cord ependymoma. Dr. Lattman treated this child with x-ray and the last time we saw the child was about two years ago; the child who was previously paraplegic was now riding his bicycle and going to school and behaving in a perfectly normal manner with the only neurological finding being a positive Romberg's sign. That was at least 5 years after operation and since then I am calculating that no news is good news. I would anticipate a somewhat similar course for this child. Of course, the zone of irradiation must of necessity affect the ovaries so the child may be infertile. This is regretable but is better than paraplegia which also would tend to induce lack of ability to reproduce.

POTTS DISEASE OF THE LUMBAR SPINE WITH PSOAS ABSCESS

WEEKLY CASE CONFERENCE

Allen S. Lloyd, M.D., William S. Anderson, M.D., Marvin M. Gibson, M.D., William J. Tobin, M.D.

In this case of tuberculosis of the lumbar spine two viewpoints are expressed on immobilization in the treatment.

CASE REPORT

J. H., a 7 year old colored girl was admitted here on October 7, 1955 because of pain in the left side of her lower back and in both legs of several days duration and because of a gibbus of her lumbar spine of about two years duration. Her mother had been hospitalized for tuberculosis for two years (1948–1950), starting when the child was 6 months old. After the child developed kyphosis, x-rays of her spine were taken and hospitalization was advised, but never carried out. As a result, the girl's "growth" was poor although her appetite remained fairly good. A cough developed about a month prior to admission here. About two days prior to admission there developed left sided low back pain of a moderately severe degree, apparently involving her legs also, but not associated with bowel or urinary functions. She had apparently been having no fever, but had had questionable night sweats.

Family history and past history were otherwise non-contributory.

Physical examination revealed a temperature of 100°. Pulse and respirations were normal. The child looked chronically ill, but in acute distress also. She appeared somewhat dwarfed and her back revealed a gibbus in the lumbar region. There was questionable slight pain on left hip flexion and she was unable to support weight on her left leg without crying out in pain. The left Achilles reflex was diminished, and the skin of the left leg was dulled to pin prick sensation. There was marked limita-

tion of forward flexion of the spine and of lateral bending. There was no tenderness over the gibbus, but there was definite left lower quadrant abdominal tenderness.

Admission CBC and urine were not remarkable; a tuberculin skin test (PPD #1) was 2 plus positive; VDRL was non-reactive; chest x-ray showed marked calcified adenopathy at the hilar areas and extending above into the paratracheal nodes. There was also some calcification in the left cervical region. X-rays of the pelvis and hips revealed marked calcification in the psoas region on the left and some calcification in the right sacroiliac region. There was fusion of the third, fourth and fifth lumbar vertebrae with the first three sacral bodies plus soft tissue swelling dorsal to this fusion. Three gastric washings were performed but there has been no growth on culture so far. A bone marrow examination was interpreted as showing an increased number of lymphocytes and monocytes which was compatible with a diagnosis of tuberculosis. Treatment was started with streptomycin and isoniazid.

Except during the first 24 hours after admission, when the temperature was between 100 and 101°F. she was afebrile. Despite bed rest, she continued to complain of pain until about a day or so after the antituberculous therapy was started. However, sedation was started concomitantly with these drugs because of moderate depression and almost constant crying.

Evaluation by the orthopedic department on the day after treatment was started revealed tenderness even on light pressure over the left sacroiliac area. There was no flexion deformity of the left hip, but limitation of left hip flexion was found, due to pain in the left sacroiliac area. Bed rest without fixation by a cast or brace was deemed advisable especially since pressure on the tender left back would be poorly tolerated.

After six days of bed rest alone she could stand on her left leg and she had minimal guarding with no tenderness on palpation over the left lower quadrant of her abdomen. At present, she is doing fairly well, but is still depressed and cries much of the time.

DISCUSSION

Dr. Lloyd:

I have never been at any meeting where Dr. Tobin was present where I did not expect disagreement. He will proceed to disagree as soon as I tell you what I think about this case, but the way I look at it is this: In tuberculosis of the skeletal system, if we could do it, the ideal treatment would be to excise the lesion very early, provided the general condition of the patient were satisfactory and the infection not disseminated. When we can not take the lesion out, the next to the ideal thing is to remove motion from the involved parts by either conservative fixation or operative treatment. It depends entirely on the given situation in the individual as to which is practical. In this particular case medical treatment (which fortunately is much more efficacious nowadays than it used to be) is also indicated. Another thing that happens in tuberculous disease of the spine is abscess formation. There again, if it is practicable to drain the abscess to get rid of the pus, that is desirable, but you must look at each individual case. In this particular case, the way I looked at it was this: I did not want to put the

child into rigid fixation so she would be forced to lie immobile from head to foot; this enhances the formation of kidney stones among other things, but I wanted her simply to have the stress of gravity removed from the involved areas. Why put on a brace or a cast? In my estimation when there is sufficiently wide involvement such as in this particular case, the muscles themselves act as an excellent splint as far as immobilization is concerned, removing rotational and angulation stresses. Certainly they are as efficient as any external fixation that you can put on because it has been demonstrated time and again that with a brace or a cast one cannot absolutely immobilize a lumbar spine. In this particular case therefore I felt that the muscle spasm together with the avoidance of gravitational stress was all the fixation that was necessary. With the motion in which she could indulge while the gravity was removed, she would be far better off as far as her general physiology and psychology were concerned than she would be if she were tied up in the manner necessary to immobilize the involved region. She has very marked tenderness over the left sacroiliac regions; I do not think the child would be nearly so comfortable with a brace or a cast pressing on that region as she is without it. In addition, with the child in the open while she is receiving the medical treatment which has only begun, one has a better opportunity to observe the development or the recession of the soft tissue abscess; therefore I advise that particular treatment at this time.

Dr. Anderson:

This case to me is a tragedy of neglect and poor follow-up. That this child's mother was in a tuberculosis sanatorium for two years about the time the child was coming into our dispensary, and this was allowed to happen is a reflection on all of us in regard to history taking and follow-up. Likewise, in the hospital where the mother was treated, the social service follow-up was certainly not adequate. We pride ourselves in this country on not using BCG vaccine because our public health measures are good enough that we do not need it. I think this is a good case to make us think a little more seriously about the use of BCG. Actually this child would have been a perfect candidate for BCG when the mother was in the hospital. In spite of that which could have been done, the child was allowed to go along and get pulmonary and bone tuberculosis, and I think it is a miracle that the child is still alive. She will be partially crippled for the rest of her life. I think we all are to be indicted in this, and at the present time it makes us think a little more seriously about our routine tuberculin tests. All of us are negligent. The American Academy of Pediatrics is going to come out soon with a recommendation from the Committee on Tuberculosis for a routine tuberculin test every six months for the first two years of life and then once a year.

I wanted to present this case because it is a tragedy that reminds us that Potts disease is not a thing of the past. As to treatment I think this child should have at least a year of uninterrupted medical therapy.

Dr. Gibson:

There is considerable agreement that the man who has made the greatest contribution to orthopedic surgery was Hugh Thomas. Thomas' principal contribution was the thesis of treating bone and joint tuberculosis with complete, absolute rest until the involvement was under control. I believe there is a lot of involvement in this patient and it appears to have progressed to a point where drainage will be necessary to get the infection under control. In a child, due to the circulation of the vertebral column, the original spot of involvement will be posteriorly. The blood supply to the vertebral body in the child is from the posterior spinal artery, coming in posteriorly; it goes well into the vertebral body before it breaks up. In the adult the circulation of the vertebral body is from the intercostal and lumbar arteries which come in subperiosteally on the anterior surface. These vessels break up very quickly resulting in an anterior and more superficial involvement. To say a word on the x-ray appearance in joint infections in tuberculosis as compared to the pyogenic organisms: in tuberculosis the joint cartilage will be preserved well past the time when there is interruption of the articular cortex. The articular cortex will become degenerated, spotty, and interrupted before there is narrowing of the joint space. Just the opposite is true in pyogenic infections where there is destruction of the joint cartilage before the articular cortex is involved. So, as Thomas would say, this child has to have complete and uninterrupted rest until the process is under control; this means immobilization, a plaster-of-paris cast extending well up on the thorax and down to each knee.

Dr. Tobin:

I am not in full agreement with Dr. Lloyd's present approach in the care of this patient, but we all have our opinions. There is a place for antibiotic and chemotherapeutic agents, but this is an old case. The child has pain. I personally feel that the child should be in a cast; if not in a cast at least put on a Bradford frame where the pressure may be taken off the buttocks. A cast could be applied from the axillas down at least to the knees. The child could be mobilized fairly well: turned over; put on her side; head of bed elevated; foot of the bed elevated. There is a possibility, as Dr. Lloyd mentioned, of renal calculi but certainly you could move the child enough to avoid that. As Dr. Anderson has said this child has gotten along amazingly well in spite of no medical treatment. Nature has been kind to this child, but that is not always the case. Regarding the efficacy of antibiotic and

chemotherapeutic agents in this case I may suggest very briefly a few remarks in summary on the present treatment of bone and joint tuberculosis. It would appear from clinical and experimental evidence that if the proper antipyogenic and antituberculous drugs are administered early, before the walling off process develops and before caseous necrosis with abscess formation occurs, control of the lesion may be obtained without surgical intervention. On the other hand if the pathological characteristics of the lesion are developed to a sufficient extent, control of the lesion by the mere use of antibiotic drugs without surgical intervention will not be effective. I am not advocating early surgery in this case, but I am advocating immobilization with a viewpoint perhaps of later doing a spinal fusion. If immobilization is still the keynote in bone and joint tuberculosis, how can the chemotherapeutic and antibiotic drugs have their maximum effect without immobilization. I strongly urge the continuation of all the medical approaches to the case but with additional immobilization.

CLINICAL PATHOLOGICAL CONFERENCE

E. Clarence Rice, M.D., Grace H. Guin, M.D., Adrian Recinos, Jr., M.D., Joseph M. LoPresti, M.D.

CASE REPORT

This 2½ year old white girl was admitted to Children's Hospital because of daily vomiting and fever to 102°F. which had persisted for six weeks.

The child was apparently normal at birth and had been bottle fed with added cod liver oil and orange juice. The routine immunizations had been given and she did well until the age of 6 months at which time she had an attack of bronchopneumonia. Following this she was well until the twenty-first month of life (9 months before admission), when she had an infection of her right heel which cleared up in a period of two weeks following local therapy.

During the five month period before admission to this hospital, the child had been admitted at various times to local hospitals for what appeared to have been bronchopneumonia. Many x-ray examinations were made, all of which were reported to have shown bronchopneumonic changes in both lungs. During this period she had seven myringotomies. A tonsillectomy was performed about four months prior to admission. The vomiting and fever which constituted the chief complaint on admission began about six weeks prior to this admission. An appendectomy was performed about five weeks before this hospitalization, but the child failed to respond, and became progressively weaker and more irritable, with persisting vomiting and fever.

Urinalysis done prior to admission revealed nothing abnormal. Numerous red cell counts averaged 4 million per cu. mm. with about 80 per cent hemoglobin. There was a constant leukocytosis of about 15,000 WBC per cu. mm. with about 50 per cent polymorphonuclear cells.

Both parents and an older sibling were living and well. There was no history of tuberculosis, syphilis, cancer, allergy, or neurologic disorder in the family.

On admission the patient was acutely ill and lethargic with a temperature of 100.6 F. Bilateral ankle clonus was the only other finding of note. Soon after admission the child was taken to the operating room and a right frontal cerebral decompression was performed, producing cloudy cerebrospinal fluid under greatly increased pressure. On examination of the fluid there were 30 cells with 30 per cent polymorphonuclear cells and 30 per cent lymphocytes; the remainder were epithelioid in type. No organisms were seen on smear. Protein was 120 mgm. per 100 ml., sugar less than 10 mgm. per 100 ml. Soon after this, generalized rigidity, left forearm clonic contractions, opisthotonos and a right internal strabismus developed. Further examination revealed a contracted left pupil with ptosis of the lid. There was generalized spasticity with increased deep reflexes and absent abdominal reflexes. The spasticity was more marked on the right side.

Hemoglobin on admission was 11.5 grams per 100 ml., WBC 11,000 per cu. mm. with segmented forms 68 per cent, lymphocytes 26 per cent, monocytes 5 per cent, eosinophiles 1 per cent. Urinalysis was normal, and Wassermann reaction negative.

X-ray showed an area of opacity and increased fibrosis over the left mastoid region. The right mastoid was clear. A ventriculogram showed the ventricular system to be fairly well outlined with enlargement of the ventricles more on the right than on the left.

Three days after admission and a few hours before death, the patient became comatose and breathed at a rate of 88 per minute. There were dullness and bronchial breathing anteriorly over the right chest with coarse tracheal rales which were audible throughout both lung fields.

Neurological signs changed constantly as the patient's condition gradually deteriorated, the temperature rising to 106 F. at death.

DISCUSSION

Dr. Recinos:

The past history indicates that four months before admission here the child had a tonsillectomy and five weeks before hospitalization an appendectomy. All through the last five months she had a number of acute illnesses which were diagnosed as pneumonia and she had seven myringotomies. Then in the last six weeks she had a fever with a daily rise to about 102 F. and vomiting. The most striking thing about this picture is the

number of infections which one would think were acute bacterial in origin. The seven myringotomies would indicate that she had acute otitis media. Whatever the therapy she received, it was not very effective. Why did she have a tonsillectomy and appendectomy? Presumably she was having repeated attacks of tonsillitis and otitis media, the principal indications for these operations. Apparently these had little effect, and possibly because of the vomiting the appendectomy was done. The laboratory work done prior to admission might point to dehydration. The family history is non-contributory.

On admission we have a child who had had numerous infections, who comes in with lethargy, and who is acutely ill with a temperature of 100.6 F. The only other positive finding was the bilateral ankle clonus. There must have been more pertinent physical findings when she was taken to the operating room. Her pulse and respiratory rates are not given. If she had a slow pulse, we might think of an expanding mass in the cerebral hemispheres. At any rate, a right frontal cerebral decompression was done and a cloudy cerebro-spinal fluid containing 30 cells per cubic millimeter with 30 per cent polymorphonuclear cells, an excess of protein, and a low sugar was obtained. No organisms were seen. Soon after the decompression the child had generalized rigidity, clonic contractions of the left forearm, right internal strabismus, and opisthotonos. On further examination there were a contracted left pupil with ptosis, generalized spasticity with increased deep reflexes, and absent abdominal reflexes. Spasticity was more marked on the right side. It is a little difficult to tie all this together.

We have some laboratory work which is not too helpful. Apparently, the disease did not involve the urinary tract.

X-ray examination of the mastoid area showed increased fibrosis over the left side. Knowing that the child had had frequent attacks of otitis media, we can expect that this is representative of a secondary mastoiditis. Ventriculograms showed enlargement of the ventricles, more on the right than left.

The first thing that comes to mind is an abscess of the brain. As one reads the protocol he may note that the child died a neurological death, following a history of frequent infections. The causes of brain abscess can be worked out here. The main causes are: (1) extensions from adjacent infections such as the middle ear, sinuses or even the site of a tonsillectomy, and (2) bacterial pulmonary infections. Remember, this child had pneumonia several times.

Brain abscesses usually develop insidiously. They first go through a stage when they act like a generalized infection of the central nervous system with fever and headache. Then, they become encapsulated and give rise to increased intracranial pressure.

The second condition which comes to mind is tuberculous meningitis.

When you read over the protocol you can see suggestions of this here and there. First of all, we have the history of pneumonia, first at six months of age which could have been the primary infection. She appears to have recovered from this. However, from twenty-two to twenty-seven months of age the child was hospitalized several times with persistent bronchopneumonic changes in both lungs by x-ray. This and the fever over a period of six weeks would go along with tuberculosis. The general condition of the child on admission and the spinal fluid findings are compatible with tuberculous meningitis. A rise in pressure and hydrocephalus is seen in this condition.

Against the diagnosis of tuberculosis is the lack of a family history. There is no record of a tuberculin test or chest x-ray. The central nervous system findings are suggestive of tuberculous meningitis, the paralysis and spasticity, and eye findings being rather typical. This diagnosis should be well considered.

The third possibility is a neoplasm. The increased intracranial pressure is one of the things that would make us think of a malignant tumor but the spinal fluid findings would be against such a diagnosis.

So, in conclusion, I would have to consider the possibilities of brain abcess, brain tumor, and tuberculous meningitis, and I believe that the last is the correct one.

Dr. LoPresti:

When I came to the meeting I had the initial impression that in order to explain all of this we would have to assume that we had one disease and that everything else was a complication of that. The first thing that entered my mind was that this youngster possibly had fibrocystic disease of the pancreas or, perhaps she demonstrated some of the findings of Gradenigo's syndrome with internal strabismus and chronic otitis media, and she subsequently developed a lateral sinus thrombosis or brain abscess.

After listening to Doctor Recinos, I remembered a statement that has been made on a number of occasions during the past four or five years, and that is whenever a child in this age group presents a constantly changing neurological picture the most likely diagnosis is tuberculous meningitis.

Dr. Guin:

The diagnosis was acute miliary tuberculosis involving practically every organ in the body. The brain and cord were involved as well as the meninges. On section the brain showed dilatation of the ventricles and some areas of tuberculosis in the region of the hypothalamus. I mention this because we have heard the discussion concerning children with bleeding duodenal ulcers who had demonstrable lesions in the hypothalamic region. This case would be another one to add to the association of thalamic pathology and

duodenal ulcer, as a duodenal ulcer was present. We went through the history, physicians' and nurses' notes to see if there was any history of hematemesis or melena to corroborate the finding of a bleeding duodenal ulcer, but found none. The tuberculous lesions were classic.

To answer the questions which I am sure are running through your minds at this point. Did we see any signs of acute inflammation as a result of these previous bouts of infection? No, there were none. Apparently it was almost a classical case of miliary tuberculosis.

Dr. Recinos:

Was a tuberculin test done?

Dr. Guin:

No, a P.P.D. was not done. In the sections of the lung one can see the granuloma with giant cells, the typical Langhans' cells, with the caseation necrosis, and the epithelioid cells about the periphery. In the alveoli there was an absence of interstitial pneumonia or bronchopneumonia that we see so frequently in children dying with simply a bacterial type of infection. The lymph nodes showed large areas of caseation. The child evidently had a primary infection at the age of six months as Doctor Recinos indicated. We found lymph nodes in the mediastinum which would corroborate this as the primary infection. We also had a growth of *M. tuberculosis* from the spinal fluid. The base of the brain was overlaid with a thick tenaceous green exudate which measured up to 1 cm. in thickness. The spleen showed large areas of caseation with many miliary tubercles.

Here we see the importance of having a high index of suspicion, for we have seen how the frequent ear infections were misinterpreted.

Dr. Recinos:

Would you comment on the spinal fluid findings?

Dr. Guin:

The increased cell count with a predominance of lymphocytes and a low sugar content should make one think of infection by the tubercle bacillus. In early invasion of the tissues by *M. tuberculosis* or any other organism there can be a small number of polymorphonuclear cells. There are always individual types of reaction of the tissues to the invading organism. One must not let findings of this sort sway him too far. If there are not other findings elsewhere to go along with it, I would begin to doubt the diagnosis.

Resident:

I was reading an article by a pediatrician in England who had the sediment from the spinal fluids of his patients with tuberculous meningitis

examined by his resident, each specimen being examined for at least two hours, and by such an examination they were able to find acid fast bacilli in the fluids in over 90 per cent of their cases.

Dr. Guin:

Yes, the longer one searches for acid fast organisms, the greater the chance of finding the organism will be.

Dr. Rice:

Doctor Recinos mentioned brain abscess as one of the possible diagnoses in this case, since the history, physical and laboratory findings may be somewhat similar to that seen in tuberculous meningitis. The history of tonsillectomy, the extraction of a tooth or some trauma to the head lead one to think of brain abscess. The spinal fluid findings may be somewhat similar, but the percentage of polymorphonuclear cells is usually higher, as may be the sugar content. Tuberculous meningitis is not very common here anymore, but 30 years ago it was one of the commonest types of meningitis seen at this hospital. Despite its present infrequency one must keep this diagnostic possibility in mind. Leukemic involvement of the meninges may give a picture which can be confused with tuberculous meningitis. Such patients will show some fever, irritability, neurological signs, and the spinal fluid will show a pleocytosis with a marked predominance of cells of the lymphocytic series. Interestingly enough, the sugar content will be low presumably due to the utilization of glucose by the leukemic cell. If one does not keep this manifestation of leukemia in mind, he is likely to misdiagnose the condition.

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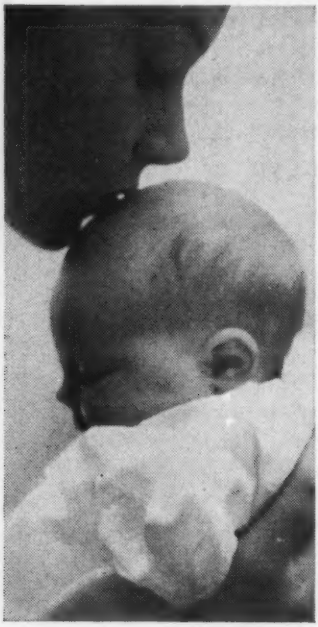

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